

IN THE CLAIMS

COMPLETE LISTING OF ALL CLAIMS, WITH MARKINGS AND STATUS IDENTIFIERS

(Currently amended claims showing deletions by ~~strikethrough~~ and additions by underlining)

This listing of claims will replace all prior versions and listings of the claims in the application.

Listing of Claims:

1. (currently amended) A method of delivering a protein to a domestic bird comprising administering to the bird in a whole-body spray an effective amount of a live avirulent derivative of an enteropathogenic bacterium comprising a recombinant gene that codes for the expression of the protein, wherein (a) the enteropathogenic bacterium is other than one that causes respiratory disease in birds, (b) the protein is delivered to the bird, and (c) the spray is composed of droplets having a mean diameter of 40-200 microns, wherein said live avirulent derivative of an enteropathogenic bacterium contains a mutation in a gene or genes selected from the group consisting of: *asd, thyA, phoP, cya, crp, and cdt*.
2. (original) The method according to claim 1 wherein the method comprises colonization by the enteropathogenic bacteria of the tissues of at least one of the gut associated lymphoid tissue (GALT), bronchus associate lymphoid tissue (BALT), lung, liver, spleen, bursa of Fabricius, and ceca of the domestic bird.
3. (original) The method according to claim 2 where the colonization further comprises expression of the protein encoded by the recombinant gene.
4. (original) The method according to claim 1 wherein the enteropathogenic bacterium is selected from the group consisting of *Escherichia, Klebsiella, Proteus, Yersinia, and Erwinia, Salmonella, Salmonella-Escherichia hybrids, Shigella, Campylobacter, Providencia, Morganella, Hafnia, Serratia, Edwardsiella, Enterobacter and Citrobacter*.
5. (original) The method according to claim 4 wherein the enteropathogenic bacterium is selected

from the group consisting of *Salmonella*, *Escherichia* and *Salmonella-Escherichia* hybrids.

6. (original) The method according to claim 5 wherein the enteropathogenic bacterium is selected from the group consisting of *Escherichia coli*, *Salmonella typhimurium*, *Salmonella typhi*, *Salmonella paratyphi*, *Salmonella enteritidis*, *Salmonella dublin*, *Salmonella gallinarum*, *Salmonella pullorum*, *Salmonella arizona*, *Salmonella enteriditis*, *Salmonella heidelberg*, *Salmonella anatum*, *Salmonella hadar*, *Salmonella agona*, *Salmonella montevideo*, *Salmonella kentucky*, *Salmonella infantis*, *Salmonella schwarzengrund*, *Salmonella saintpaul*, *Salmonella brandenburg*, *Salmonella istanbul*, *Salmonella cubana*, *Salmonella bredeney*, *Salmonella braenderup*, *Salmonella livingstone*, *Salmonella berta*, *Salmonella california*, *Salmonella senftenberg*, *Salmonella mbandaka* and *Salmonella choleraesuis*.
7. (withdrawn) The method according to claim 6 wherein the enteropathogenic bacterium is selected from the group consisting of *Salmonella typhimurium* strains χ3115 (ATCC 39961) and χ3137 (ATCC 39962).
8. (withdrawn) The method according to claim 5 wherein the enteropathogenic bacteria are an avirulent *Salmonella* which contains a mutation in the *phoP* gene, wherein the avirulent *Salmonella* is unable to cause *Salmonella*-based disease symptoms and is able to colonize in lymphoid tissue for a sufficient time to induce antibody and cellular immunity, and wherein the strain retains the properties of avirulence and immunogenicity of a *Salmonella* stain selected from the group consisting of ATCC 53864, ATCC 53865, and ATCC 53866.
9. (original) The method according to claim 1 wherein the enteropathogenic bacteria are a derivative of a pathogenic strain of bacteria characterized by:
 - a) a lack of a functioning native chromosomal gene encoding a first enzyme which is a β-aspartic semialdehyde dehydrogenase (Asd);
 - b) the presence of a first recombinant gene encoding a second Asd enzyme wherein the first recombinant gene cannot recombine to replace the defective chromosomal gene;
 - c) the presence of a second recombinant gene encoding a desired polypeptide; and
 - d) physical linkage between the first recombinant gene and the second recombinant gene, wherein loss of the first recombinant gene causes the bacteria to lyse when in an environment

which requires expression of the first recombinant gene for cell survival.

10. (original) The method according to claim 9 wherein the enteropathogenic bacteria are selected from the group of strains consisting of χ 6097 (ATCC 67537), χ 3520 (ATCC 53681), χ 4072 (ATCC 67538), χ 3008 (ATCC 53680), χ 2108 (ATCC 53678), and χ 6097 (ATCC 67813).
11. (withdrawn) The method according to claim 5 wherein the enteropathogenic bacterium comprises a live avirulent *Salmonella*, having a mutation in a *cdt* gene, where the *Salmonella* has the phenotype of failure to colonize deep tissue.
12. (withdrawn) The method according to claim 11 wherein the enteropathogenic bacterium is selected from the group of strains consisting of χ 3985 (ATCC 55110), χ 4326 (ATCC 55115), χ 4346 (ATCC 55113), χ 3940 (ATCC 55119), χ 4073 (ATCC 55118).
13. (withdrawn) The method according to claim 6 wherein the enteropathogenic bacterium is a live avirulent *Salmonella choleraesuis* obtained from a pathogenic strain of *S. choleraesuis*, and where the avirulent *S. choleraesuis* has been made avirulent by an inactivating mutation in a *cya* gene and an inactivating mutation in a *crp* gene.
14. (withdrawn) The method according to claim 13 wherein the enteropathogenic bacterium comprises strain χ 3781 (ATCC 67923).
15. (withdrawn) The method according to claim 13 wherein the enteropathogenic bacterium is a live avirulent *Salmonella typhi* that is obtained from a pathogenic *S. typhi* strain and is made avirulent by an inactivating mutation in the structural *crp* gene.
16. (withdrawn) The method according to claim 15 wherein the enteropathogenic bacteria are selected from the group of strains consisting of χ 3927 (ATCC 55117) and χ 4323 (ATCC 55115).
- 17-21. (cancelled)
22. (original) The method according to claim 1 wherein the spray administration comprises spraying

droplets having diameters in the range of from 50 microns to 150 microns.

23. (original) The method according to claim 22 wherein the spray is administered in a dose of from about 10^4 to about 10^8 colony forming units of the live avirulent derivative of a pathogenic bacterium.
24. (original) The method according to claim 23 wherein the spray is administered in a dose of from about 10^5 to about 10^7 colony forming units of the live avirulent derivative of a pathogenic bacterium.
25. (original) The method according to claim 24 wherein the spray is administered in a dose of at least about 1×10^6 colony forming units of the live avirulent derivative of a pathogenic bacterium.
26. (original) The method according to claim 23 wherein the poultry are less than 104 weeks of age.
27. (original) The method according to claim 26 wherein the poultry are 3 weeks of age or less.
28. (original) The method according to claim 27 wherein the poultry are less than one day of age.
29. (original) The method according to claim 26 wherein the poultry are chickens.
30. (original) The method according to claim 26 wherein the spray administration is followed by administration of at least one booster dose of the vaccine.
31. (original) The method according to claim 30 wherein the booster dose of vaccine is administered by spray administration.
32. (original) The method according to claim 30 wherein the booster dose of vaccine is administered in drinking water.
33. (original) The method according to claim 30 wherein a booster dose is administered 14 days after

the spray administration.

34. (original) A domestic bird that has been treated by the method of claim 1.